Week-In-Review #5 (6.1, 6.2, 6.3)

1. A and B are sets of a universal set, U. Use set-builder notation to define:

   (a) A^C

   (b) $A \cap B$

   (c) $A \cup B$

   (d) $A^C \cap B^C$

2. U = the set of all TV watchers
   S = the set of people who watch soap operas on TV
   G = the set of people who watch game shows on TV
   P = the set of people who watch sports on TV

   (a) Describe each of the following sets in words. (Do not use math jargon!)

      (i) S^C

      (ii) $S \cap P^C$

      (iii) $S \cup G \cup P$

      (iv) $G \cap (S \cup P)$

   (b) Write each of the following using set notation (ie: using only $S, G, P, \cap, \cup$, and/or ^{C})

      (i) The set of TV watchers who watch soap operas or game shows.

      (ii) The set of TV watchers who watch game shows, but not sports.

      (iii) The set of TV watchers who only watch sports.

      (iv) The set of TV watchers who watch soap operas or game shows, but not both.

3. $U = \{1,2,3,4,5,6,7,8,9,10\}$
   $A = \{x \mid x \in U \text{ and } x \text{ is even}\}$
   $B = \{x \mid x \in U \text{ and } x \text{ is odd}\}$
   $C = \{2,3,5,6,8,9\}$
   $D = \{1,7,10\}$

(a) Draw a Venn diagram representing the sets.

(b) Find the following sets:

(i) A^C

(ii) $D \cap A^C$

(iii) $B \cap C^C$

(iv) $(A \cup B) \cap C^C$

(v) $A \cup (B \cap C^C)$

(c) Are the following true or false?

(i) $D \subseteq B$

(ii) $\emptyset \subseteq A$

(iii) $\{2, 4\} \in A$

(iv) $\{3, 5, 9\} \subset C$

(v) $A^C = B$

(vi) $A \cup A^C = U$

(vii) $B \cap B^C = 0$

(viii) $\emptyset \in A$

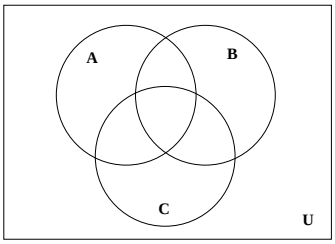
(ix) $A \cup B = U$

(x) $3 \in B$

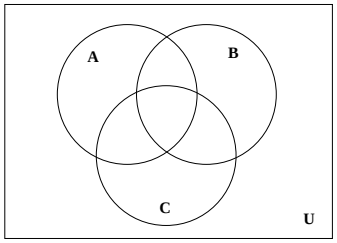
(d) How many subsets and proper subsets does each set (A, B, C, D, and U) have?

4. Shade the portion of the Venn diagram that represents the given sets.

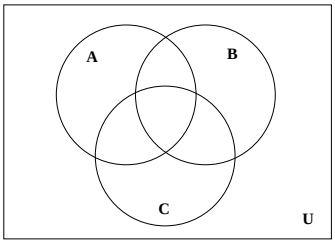
(a) $A^C \cap B \cap C^C$



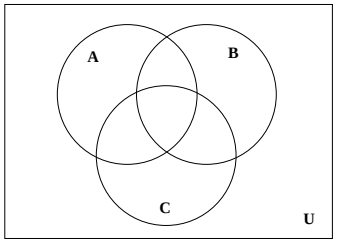
(b) $A^C \cap (B \cup C^C)$



(c) $(A \cup B) \cap C^C$



(d) $(A \cap B) \cup C^C$



5. Of 100 people surveyed 50 people liked the color blue, 60 liked the color yellow, and 70 liked blue or yellow. How many of the people surveyed liked

(a) Both blue and yellow?

(b) Either blue or yellow, but not both?

(c) Neither blue nor yellow?

(d) Only blue?

(e) Only yellow?

6. A survey of 500 A&M students was taken to determine the readership of the Battalion, the Bryan-College Station Eagle, and the Houston Chronicle. The survey found that

- 424 read the Battalion
- 34 read the Chronicle
- 35 read the Eagle
- 12 read the Battalion and Chronicle
- 15 read the Battalion and Eagle
- 9 read the Chronicle and Eagle
- 3 read all three papers

How many of the students surveyed

(a) read none of the three papers?

(b) read just the Eagle?

(c) read the Battalion and the Chronicle, but not the Eagle?

(d) read at least two of the three papers?

7. A survey of 500 A&M students was taken to determine the readership of the Battalion, the Bryan-College Station Eagle, and the Houston Chronicle. The survey found that

- 415 did not read the Chronicle, but did read either the Battalion or the Eagle
- 402 read the Battalion but not the Eagle
- 25 read the Eagle, but not the Chronicle
- 17 read the Battalion and the Chronicle
- 14 read the Battalion and the Eagle
- 9 read the Chronicle and the Eagle
- 10 read only the Chronicle

How many of the students

(a) read all three of the papers?

(b) read just the Battalion?

(c) read either the Battalion or the Chronicle, but not both?

(d) read at most one paper?

8. A breakfast special includes an entree, one side, and a choice of drink. There are 5 different entrees, 10 different sides and 6 different drinks to choose from. How many different breakfast specials are possible?

9. How many different 4-digit codes are possible if

(a) there are no restrictions placed on the digits?

(b) no repetition of the digits is allowed?

(c) every digit in the code must be odd?

(d) the first digit must be even and no digit can be repeated?

(e) the code must form an even number?

(f) the code must have at least one digit that is different than the rest?

10. A group of 3 couples (Allison and David, Breanna and Ethan, and Cassie and Frank) go to the movies and all sit in one row of 6 seats. In how many different ways can they be seated if

(a) there are no seating restrictions?

(b) the girls and boys are seated alternately?

(c) Allison must sit on the left end seat and Frank must sit on the right end seat?

(d) girls must be seated in the middle two seats and boys must be seated in the end seats?

(e) the couples must be seated next to one another?